Report for 2003NY22B: Extreme Precipitation and Consecutive Dry-day Climatology for New York State Applied to Water Resource Management

There are no reported publications resulting from this project.

Report Follows

Extreme Precipitation and Consecutive Dry-day Climatology for New York State Applied to Water Resource Management Basic Information

Problem and Research Objectives

Stormwater, particularly from urban areas is also a growing source of pollution in New Yorks waterways. The effective management of this pollution source and the implementation of policies focused on best management practices require knowledge of the meteorological conditions that lead to these runoff events. Climatological information describing peak rainfall and snowmelt volumes as well as the length of time over which pollutants can accumulate on impervious surfaces (consecutive rain-free days) is critical for modeling, designing and managing stormwater discharges and pollutant loads. Enforcement of stormwater regulations will require information on expected storm magnitudes, in particular to identify events that may exceed current design specifications. Climatological data currently used are either outdated or unavailable in a succinct summarized format. The aim of this proposal is to develop and update these climatologies and to disseminate this information through an electronic atlas to assist stormwater management.

Objectives:

To develop and make available sound data that will assist in estimating expected volumes of stormwater under varying climatological conditions. To meet this goal there are seven primary objectives:

1) A revised set of isohyetal maps for New York depicting the spatial distribution of 24-, 12-, 6-, and 1-hour precipitation accumulations for return periods of 2,5,10,25,50,and 100 years.
2) 2) The creation of a set of homogeneous extreme precipitation subregions for New York. Within each subregion, the partial duration extreme rainfall distributions of all stations will be statistically equivalent. This will allow the results of the subsequent analyses to be presented by subregion.
3) 3) A composite set of extreme rainfall intensity-duration curves will be computed for each subregion.
4) 4) On a subregional basis, weekly extreme rainfall probability plots will be compiled. These graphs will identify the probability of receiving a storm of a given magnitude during each week of the year.
5) 5) The analyses in Objectives 3 and 4 will be repeated to account for the combined volume of snow melt and rainfall.
6) 6) Daily probability graphs for the occurrence of consecutive dry days will be computed for each extreme precipitation subregion.
7) 7) This suite of climatological products will be disseminated in the form of an electronic (Worldwide Web) atlas.

Methodology

Daily data from over 210 stations across New York, as well as, additional stations from adjacent portions of neighboring states will be used to develop a set of isohyetal maps. These maps will depict the spatial distribution of 24-, 12-, 6-, and 1-hour precipitation accumulations corresponding to return periods of 2, 5, 10, 25, 50 and 100 years. Partial-

duration precipitation data (i.e. the n largest daily precipitation values in n years of record) will be used to the compute return periods. Based on these station data, the state will be divided in extreme precipitation subregions such that no statistical differences will exist between the empirical partial duration extreme rainfall series of each station within a subregion. For each of these subregions extreme rainfall intensity-duration curves and weekly extreme rainfall occurrence probability plots will be computed. These analyses will be conducted for rainfall alone and at selected stations reflects the combined volumes of rainfall and snowmelt. Daily probability graphs for the occurrence of consecutive dry days will be also constructed. These graphs will be based on daily counts of the number of times that a precipitation event of 0.10 inches or more was preceded by dry periods ranging from 1 to 30 days in length.

We have completed each of the proposed project tasks over the last year. In particular our work has led to:

1. A revised set of isohyetal maps for New York depicting the spatial distribution of 24-, 12-, 6-, and 1-hour precipitation accumulations for return periods of 2,5,10,25,50,and 100 years. At the request of the NY State DEC we have also included 1-year return period maps which were originally not proposed.

2. The creation of a set of homogeneous extreme precipitation subregions for New York. Within each subregion, the partial duration extreme rainfall distributions of all stations are statistically equivalent. This allows the results the analyses to be presented by subregion, rather than station.

3. A composite set of extreme rainfall intensity-duration curves for each subregion.

4. Weekly extreme rainfall probability plots, on a subregional basis,. These graphs identify the probability of receiving a storm of a given magnitude during each week of the year.

5. Items 3 and 4, above were repeated to account for the combined volume of snow melt and rainfall. These analyses revealed only subtle changes in the extreme precipitation statistics.

6. Daily probability graphs for the occurrence of consecutive dry days for each extreme precipitation subregion.

7. This suite of climatological products is available in an electronic atlas which can we accessed via the Internet at <http://www.nrcc.cornell.edu/pptext/>